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Inside Debt and the Design of Corporate Debt Contracts

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Theory posits that managerial holdings of debt ("inside debt") align managers' incentives with those of outside debtholders. Executive pensions, consisting of rank-and-file (RAF) plans and supplemental executive retirement plans (SERPs), and other deferred compensation (ODC) have debt-like payoffs, and could therefore function as inside debt. However, whereas SERPs are often unfunded and unsecured, RAF plans are funded and secured to some extent, and ODC may be invested in equity and withdrawn flexibly before retirement. Special arrangements in executive debt-like compensation could hence weaken or even nullify any incentive-alignment effect. We find that higher CEO debt-like compensation leads to lower promised yield and fewer covenants in a sample of loans originated in 2006–2008. This effect is driven entirely by benefits accrued under SERPs, consistent with SERPs more closely resembling risky corporate debt; balances accrued under RAF and ODC plans do not provide similar effects. Furthermore, promised yields are lower when debt-like compensation claims can be withdrawn only after outside debt claims are expected to settle. Our findings persist after accounting for endogeneity using state personal income tax rates as an instrument for CEOs' willingness to defer compensation. Overall, the evidence suggests that executive debt-like compensation is only effective at resolving stockholder–debtholder conflicts when its payoffs are truly debt-like and that lenders' perceptions are affected not only by the magnitude of debt-like compensation but also by its seniority.

Data, as supplemental material, are available at http://dx.doi.org/10.1287/mnsc.2013.1813.

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1. Introduction

Agency theory posits that managerial holdings of debt ("inside debt") mitigate stockholder–debtholder conflicts in leveraged firms (Jensen and Meckling 1976, Edmans and Gabaix 2009, Edmans and Liu 2011). Stockholder–debtholder conflicts arise from the fundamentally different payoffs that debtholders (fixed claimants to firm assets) and stockholders (residual claimants) receive. Once debt has been issued, stockholders (or managers, acting on their behalf) can increase the value of equity at the debtholders' expense in various ways, including claim dilution, underinvestment, and risk shifting (Jensen and Meckling 1976, Myers 1977, Smith and Warner 1979). When an executive is compensated only with equity ("inside equity"), she has incentives to increase firm risk beyond a level that debt holders prefer and to take actions that transfer wealth from debtholders to stockholders. When an executive's compensation consists of both debt and equity claims on the firm, her incentives then vary with the relative importance of debt- versus equity-based compensation in her pay ("inside leverage"). The higher an executive's inside leverage relative to firm leverage ("relative leverage"), the more closely her incentives are aligned with debt holders vis-à-vis stockholders and the lesser the degree to which she engages in risk taking to the detriment of debtholders (Sundaram and Yermack 2007, Edmans and Liu 2011).

Sundaram and Yermack (2007) point out that pensions and other deferred compensation (ODC) plans, an important feature of executive compensation in the United States, have debt-like payoffs and could function as inside debt.[1] These plans are broadly structured such that a firm promises to pay its executive fixed amounts at or after retirement as long as it is solvent. In insolvency, the executive generally risks

[1] Pensions and ODC of S&P 1500 CEOs averaged 25% (43%) of the value of their inside equity in 2007 (2008).

losing benefits accrued under these plans because they are often unfunded and unsecured, leading to the characterization of these plans as being "debt-like compensation." On closer examination, however, it is unclear whether executive pension and ODC plans, in practice, offer truly debt-like incentives. Some studies (e.g., Bebchuk and Fried 2004, Bebchuk and Jackson 2005) argue that executive pension and ODC plans contain many special arrangements instituted to ensure benefit security, which may weaken or even nullify any potential incentive-alignment effect.

For pension and ODC plans to function as inside debt, first, their payoffs must be debt-like in nature (i.e., payoffs in solvency must be fixed, and payoffs in insolvency must be proportional to the firm's liquidation value). Second, even if these plans have truly debt-like payoffs, whether they are effective at aligning managers' incentives with outside debtholders' incentives depends on whether plan balances are senior to outside debtholders' claims. We discuss below each form of debt-like compensation observed in the United States and the institutional features that could affect their incentive-alignment potential.

Executive pension plans typically include tax-qualified plans that cover all employees (rank-and-file, or RAF plans), and supplemental executive retirement plans (SERPs) restricted to top executives. RAF pension plans are required to be funded and secured under the Employee Retirement Income Security Act of 1974 (ERISA). If a firm goes bankrupt with an underfunded RAF plan, the Pension Benefit Guaranty Corporation (PBGC) funds the deficit, up to a maximum limit reset by law annually ($56,000 per beneficiary in 2012). RAF balances are hence shielded from firm insolvency to some extent, making them less debt-like and limiting their potential to align managerial interests with outside debtholders' interests.

Because of ERISA limits on the maximum pensions allowed in RAF plans ($200,000 annually in 2012), many firms set up SERPs to accrue additional benefits for top executives.[2] Because SERPs do not have to be funded or secured, they expose executives to risk of loss in insolvency and, hence, more closely resemble unsecured corporate debt in payoffs than RAF plans. There is, however, considerable heterogeneity in the way SERP contracts are designed, which may affect their incentive-alignment potential (e.g., Bebchuk and Fried 2004, Bebchuk and Jackson 2005, Clark Consulting 2009, Gerakos 2010). For instance, firms sometimes allow CEOs to take a lump-sum pension payout at retirement and/or withdraw pension benefits prior to normal retirement age, allowing CEOs to demand payment of their pension benefits flexibly and possibly making CEO claims senior to those of outside debtholders. Firms may also voluntarily fund trusts to shield executive pension assets from general debtholders.

ODC plans involve current compensation that executives voluntarily defer and agree to withdraw later, on a prespecified schedule. ODC plans do not have to be secured or funded, similar to SERPs, but differ significantly from SERPs in withdrawal flexibility and payment form (Clark Consulting 2009, Lee and Tang 2010, Wei and Yermack 2011). First, although pension benefits are usually paid out at or after retirement, ODC plans often allow withdrawal on a prespecified schedule that can start before retirement, leaving the executive with flexibility over the maturity of her claims.[3] Second, ODC plans often allow (and at times even require) the executive to invest balances in the firm's own equity. Although flexible withdrawal schedules increase the seniority of ODC claims by allowing withdrawal ahead of outside debt holders, the option to invest deferrals in equity makes ODC balances less debt-like to begin with.

Therefore, although the theoretical implications of inside debt are unambiguous, whether executive debt-like compensation functions as inside debt, and effectively resolves stockholder–debtholder conflicts, remains an empirical question. We address this question by examining whether and how executive debt-like compensation, in its various forms, affects the terms of new private loan contracts. We focus on private loans because many of the special arrangements described above are not subject to full disclosure requirements; obtaining and analyzing information on these arrangements can therefore be costly. Private lenders, who have few options to exit before the loan is due, not only have access to this inside information but also have strong incentives to acquire it.[4] Examining how private lenders perceive debt-like compensation, therefore, allows for a refined examination of

[2] Two approaches exist for providing additional benefits above ERISA-qualified limits: restoration plans and supplemental plans (SERPs). Restoration plans are broad-based plans that cover all employees earning above the allowed ERISA maximum. SERPs may include only a few top executives and may use formulae that need not be linked to qualified plans' terms. We use "SERP" broadly to refer to both kinds of plans.

[3] Although recent amendments to the Internal Revenue Code (Section 409A) restrict executives' ability to accelerate withdrawals at will, executives may still withdraw balances before retirement under certain conditions.

[4] Public debtholders are dispersed and may exit before the debt comes due. Beatty et al. (2012) show that public debtholders often delegate monitoring to private lenders. Furthermore, private lenders may continue to have an information advantage even after the enactment of Regulation S-K in 2006, which requires all firms to disclose balances accrued under pension and ODC plans. Although Regulation S-K requires companies to provide a succinct narrative description of any material factors necessary to an understanding of each plan, no clear guidance is given on what details firms should disclose about special arrangements for these plans (Gerakos 2010, Wei and Yermack 2011).

how effective such compensation is at aligning managers' interests with those of outside lenders.

We start by examining the average effect of executive debt-like compensation on loan contracting terms. For a sample of 1,462 private loans originated in 2006–2008, we find that firms with higher CEO relative leverage receive lower yield and face fewer covenants, which is consistent with debtholders perceiving an incentive-alignment effect from executive debt-like compensation. To address endogeneity, we propose state personal income tax rates as an instrumental variable (IV) for CEO relative leverage. Ceteris paribus, CEOs subject to higher state income tax rates have stronger incentives to defer income through pensions and ODC plans because the benefits of deferring income (saving the time value of money on tax payments, and/or paying a potentially lower tax rate on retirement income, if the executive relocates in retirement to a lower-income-tax state) increase with their marginal tax rates. State personal income tax rates are, however, unlikely to directly affect firm-level yields and covenant usage, making them a plausible candidate for an IV. In the IV analysis, we demonstrate that the IV satisfies a series of validity checks and find that a higher fitted CEO relative leverage leads to lower promised yields and fewer covenants.

We next examine each type of debt-like compensation separately to assess whether private lenders' perceptions of incentive alignment depend on the extent to which the payoffs to debt-like compensation resemble payoffs to risky corporate debt. Between pension and ODC plans, we find that the average incentive-alignment effect of debt-like compensation is driven entirely by pensions, which account for only *half* of all CEO debt-like compensation. ODC balances have no significant effect on loan terms, even after we attempt to isolate the portion of ODC balances not invested in firms' own equity. We conclude that the short-term, flexible-withdrawal nature of ODC balances (and their resulting effective seniority to outside debtholders' claims) may mute any incentive alignment that arises from their debt-like payoffs.

Within pensions, we find that RAF plans have no significant effect on loan contract terms, consistent with their being relatively less exposed to credit risk. The perceived incentive alignment from pensions is hence driven entirely by SERPs, which are exposed to higher risk of loss in insolvency. In ordinary least squares estimation, increasing CEO SERP-based relative leverage from the 25th to 75th percentile reduces the all-in-drawn spread by two basis points over the London Interbank Offered Rate (LIBOR). This corresponds to a saving in borrowing cost of approximately $157,400 per year, based on the average loan size in our sample ($787 m).

The seniority of debt-like compensation may also affect the incentive alignment it creates between managers and outside debtholders. We construct a measure capturing one key aspect of seniority: the duration of debt-like compensation. By combining data and assumptions on CEO time to retirement, payment schedules (lump-sum or life annuity), and CEO life expectancy, we calculate a Macaulay duration of each CEO's debt-like compensation and compare it to the duration of the outside loan being issued. When the CEO's debt-like compensation has longer duration than outside debt—suggesting that debt-like compensation claims are likely less senior to outside debt claims, we find that promised yields are lower, controlling for relative leverage. This suggests that the incentive alignment perceived by lenders is affected not only by the amount of debt-like compensation, but also by its relative seniority.

The seniority of debt-like compensation may be endogenous. For example, managers may demand early settlement of pension benefits when they are uncertain about their firms' future prospects, and these firms may also face more stringent loan terms. We again propose state personal tax rates as an IV for the seniority of debt-like compensation. The U.S. tax code allows individuals to relocate after retirement from a high-income-tax state to a low-income-tax state and avoid taxation on retirement income by the high-income-tax state as long as the income is paid periodically over the beneficiaries' life expectancy or at least over 10 years. This gives CEOs from high-income tax states the incentive to not only defer more income but also defer over longer periods of time. The IV analysis confirms that loan spreads are lower when debt-like compensation claims are likely to be less senior to outside debtholders' claims.

We contribute to the emerging literature on the economic consequences of executive debt-like compensation. Prior to Sundaram and Yermack (2007), the literature on executive compensation and its implications for debtholders focused on equity-based incentives (e.g., John and John 1993, Ortiz-Molina 2006, Brockman et al. 2010). Starting with Sundaram and Yermack (2007), a stream of literature has emerged with the general consensus that pension and ODC plans, as a whole, function as inside debt and are effective at mitigating stockholder–debtholder conflicts. These studies show that firms providing their CEOs with more debt-like compensation have lower likelihood of default (Sundaram and Yermack 2007), engage in less risk taking (Tung and Wang 2011, Cassell et al. 2012), face fewer covenants in bond contracting (Chava et al. 2010), and are priced higher in the secondary bond market (Wei and Yermack 2011). We complement these studies by first documenting an average incentive-alignment effect of debt-like compensation on private loan contracting. We then highlight an important caveat to the emerging consensus; in practice, a substantial portion of debt-like compensation is subject to institutional modifications that reduce its risk of loss in insolvency or make it effectively senior to outside debt. The incentive-alignment effect is weaker or nonexistent in these cases. Overall, our results suggest that a careful examination of the institutional features of pension and ODC plans is warranted before interpreting the existence of such plans as being consistent with the use of inside debt.[5]

Our findings also have implications for compensation reforms mandated by the Dodd-Frank Act for U.S. banks and by the European Union for European banks that defer payment of executive bonuses and pay a reduced amount if the firm sustains losses subsequently ("hold backs"). Because such deferrals resemble debt-like compensation to some extent, understanding how much debt exposure executives already have through preexisting components of their compensation (e.g., pension or ODC plans) is crucial to any discussion on mandating further deferrals.

2. Sample, Variables, and Descriptive Statistics

2.1. Sample Selection

We retrieve data on CEO debt-like and other compensation from the ExecuComp database for fiscal years 2006–2008. On August 29, 2006, the SEC issued a new rule requiring tabular disclosure of the present value of benefits accrued under pension and ODC plans. These disclosures allow us to provide large-sample evidence on the role of executive debt-like compensation in debt contracting. Prior to 2006, firms were required to disclose annual pension benefits payable at retirement but not the present value of accumulated benefits. Disclosure requirements for ODC balances were almost nonexistent.

We collect the promised yield, covenant, and other related information for private loans issued by U.S. firms between January 1, 2006, and May 31, 2009, from the Loan Pricing Corporation's DealScan database. We collect financial statement data for control variables from Compustat Industrial Annual Files. As in Bradley and Roberts (2004) and Chava and Roberts (2008), we exclude financial firms (Standard Industrial Classification codes 6000–6999). These criteria yield a sample of 1,462 facilities and 1,267 packages. Although loan pricing is specified at the level of a loan, or "facility" (the basic unit in DealScan), covenants are written at the level of a "package," which may contain several facilities. Thus, in multivariate analyses we examine promised yield at the facility level and covenant usage at the package level. The sample has 677 unique firms, with an average firm issuing approximately two facilities. About 80% of facilities were issued in 2006–2007, with the reduction in issuances in 2008 being a possible result of the financial crisis.

2.2. Variable Measurement

2.2.1. Relative Leverage. Theory suggests that the CEO's personal debt-to-equity ratio (inside leverage) *relative to* the firm's debt-to-equity ratio (firm leverage) captures her incentive alignment with debtholders vis-à-vis stockholders (Sundaram and Yermack 2007, Edmans and Liu 2011). The larger the CEO's inside leverage relative to firm leverage is, the stronger her incentives to decrease firm risk. Hence, we measure CEO incentives using the CEO's inside leverage divided by firm leverage, or her "relative leverage" (*RLEV*).

The CEO's inside leverage is the CEO's debt holding divided by equity holding at the fiscal year end. The CEO's debt holding is the actuarial present value of benefits accumulated under defined-benefit pension plans and the balance in any ODC plans. The CEO's equity holding is the fair value of her stock, restricted stock, and option holdings. Firm leverage is long-term debt plus debt in current liabilities scaled by the market value of equity at the fiscal year end.

2.2.2. Promised Yield and Covenant Usage. Following Bradley and Roberts (2004) and Ivashina (2009), we measure promised yield using the all-in-drawn spread promised at loan inception in basis points scaled by 100 (*SPREAD*). *SPREAD* represents the coupon spread and fees (net of upfront fees) a borrower pays over LIBOR for each dollar drawn down from the loan. For loans not based on LIBOR, DealScan converts the coupon spread into LIBOR terms by adding or subtracting a constant differential reflecting historical averages of relevant spreads, allowing for comparisons across loans of differing fee or rate structures (Bradley and Roberts 2004). Following Chava and Roberts (2008), we measure covenant usage (*COVENANT*) by counting the number of covenants present in a package from 16 financial covenants (see Table I of Chava and Roberts 2008) and one investment covenant found in lending agreements in our sample.[6]

[5] Concurrent studies by Chen et al. (2010) and Wang et al. (2011) also document an average effect of executive debt-like compensation on loan contracting. They do not, however, examine the various forms, institutional features, or duration of such compensation.

[6] Observations with zero covenants may represent incomplete collection of information or misclassification by DealScan (Drucker and Puri 2009). In robustness checks, we restrict our sample to only those packages with nonzero covenants. Our empirical results are virtually unchanged.

2.2.3. Control Variables. Control variables include CEO characteristics and other compensation. We control for CEO tenure because CEOs who have been with the firm longer accrue more pensions and ODC (Sundaram and Yermack 2007). We control for CEO salary because salary, being a fixed payment contingent on solvency, may mitigate risk-taking incentives (Begley and Feltham 1999), and for CEO bonus because earnings-based bonus plans motivate managers to seek stable cash flows (Duru et al. 2005). We control for the change in CEO wealth for a 1% change in stock price (CEO portfolio delta) and for a 0.01 change in stock return volatility (CEO option vega) because a high vega (delta) may lead to more (less) risky investment choices (e.g., Rajgopal and Shevlin 2002, Coles et al. 2006, Gormley et al. 2013). Following Edmans et al. (2009), we scale delta by annual total compensation, resulting in a more theoretically correct measure that is independent of firm size. We also control for loan characteristics including loan amount, maturity, size of the lending syndicate, and whether at least one lead arranger is an investment bank, U.S. bank, or foreign bank (Bradley and Roberts 2004, Denis and Mihov 2003). Furthermore, we control for firm characteristics that drive the intensity of stockholder–debtholder conflicts: growth opportunities measured with the market-to-book ratio (following Myers 1977, Kahan and Yermack 1998), firm size, profitability, leverage, asset tangibility, cash-flow volatility, and default risk measured with the Altman (1968) *Z* score. Finally, we incorporate year and industry fixed effects using the Fama-French 12-industry classification.

2.3. Descriptive Statistics and Correlations

Table 1 displays summary statistics with continuous variables (except for loan amount and maturity) winsorized at 1% and 99%. Borrowers pay an average spread of 125 basis points over LIBOR, in line with Bradley and Roberts (2004). The median package carries one covenant. Similar to Wei and Yermack (2011), we find that the distribution of relative leverage is right-skewed with mean (median) of 1.29 (0.33). The average relative leverage from pension plans (0.68) is similar to that from ODC plans (0.61), but 66% of the sample has ODC while only 54% has pensions. In untabulated statistics, the mean (median) magnitude of debt-like compensation is \$7.8 m (\$2.4 m) for the entire sample and \$9.8 m (\$4.2 m) in firms with some debt-like compensation. Mean (median) pension balances are \$3.9 m (\$0.18 m) in the entire sample and \$7.3 m (\$4.2 m) in firms with pension plans, while ODC balances are \$3.8 m (\$0.56 m) for the entire sample and \$5.8 m (\$1.8 m) in firms with ODC plans. Pension (ODC) balances, as a percentage of inside equity, are on average 31% (10%) in the entire sample and 39% (17%) in the sample with some pension (ODC) plans. Average CEO tenure is 6.5 years. Average salary and bonus are \$892,000 and \$243,000. The average vega (delta scaled by annual total compensation) is \$252,400 (0.12). The mean (median) loan facility amounts to \$787 m (\$350 m), and the average loan maturity is 4.4 years. The sample consists mostly of large firms with mean (median) market capitalization of \$12 billion (\$3 billion).

3. Does CEO Debt-Like Compensation Affect Debt Contracting? The Average Effect

3.1. The Association of Debt-Like Compensation with Loan Contract Terms

If private lenders perceive pension and ODC plans as providing debt-like incentives, they would accept lower promised yield from firms with higher CEO relative leverage from such plans. They may also include fewer contingent provisions in debt contracts ("covenants") that restrict managerial actions after debt issuance.[7] We examine how private lenders perceive debt-like compensation on average, with the following model (i indexes firm and t indexes time):

$$SPREAD_{i,t}(COVENANT_{i,t}) = \alpha_0 + \alpha_1 RLEV_{i,t} + \sum_{q=2}^{m} \alpha_q (q\text{th Control Variable}) + \varepsilon_{i,t}. \tag{1}$$

The variable of interest is CEO relative leverage (*RLEV*). If private lenders perceive pension and ODC plans as aligning managers' interests closer to their own, we should observe a negative coefficient on *RLEV* with all-in-drawn spread (*SPREAD*) or number of covenants (*COVENANT*) as the dependent variable. Because private lenders have access to inside information on compensation practices and relative leverage can be estimated at the beginning of the year given the terms of pension and ODC plans, we examine the impact of *RLEV* on contemporaneous loan contracting.[8]

[7] Because debtholders cannot fully anticipate opportunism by stockholders or managers and contract on it *ex ante* (Leland 1998), covenants are a key aspect of loan contracting. Covenants may restrict some actions (e.g., paying dividends, disposing assets, issuing additional debt), endorse other actions (e.g., maintaining the firm's properties), or require maintenance of financial ratios (e.g., minimum net worth, interest coverage). On violation of covenants, control rights transfer to lenders, who then have the opportunity to intervene in firm decisions (Chava and Roberts 2008).

[8] Results are qualitatively similar if we replace *RLEV* with lagged relative leverage (*LAGRLEV*), although the coefficients on *LAGRLEV* are of smaller magnitude than those reported in Table 2 on *RLEV*.

Table 1 Descriptive Statistics

Variable	*N*	Mean	Std. dev.	5%	25%	Median	75%	95%
Dependent variables: Loan contracting terms								
SPREAD	1,462	1.246	1.082	0.200	0.450	0.875	1.750	3.250
COVENANT	1,267	1.243	1.184	0.000	0.000	1.000	2.000	3.000
Key independent variables: CEO debt-like compensation and its institutional features								
RLEV	1,462	1.287	3.452	0.000	0.019	0.331	1.090	5.014
RLEV_PEN	1,462	0.679	2.163	0.000	0.000	0.028	0.531	2.739
RLEV_ODC	1,462	0.608	2.145	0.000	0.000	0.067	0.396	2.534
RLEV_RAF	777	0.192	1.233	0.000	0.005	0.025	0.091	0.617
RLEV_SERP	777	1.064	2.250	0.000	0.099	0.432	0.994	4.315
DIFFDURATION_NRA	1,462	0.734	0.442	0.000	0.000	1.000	1.000	1.000
DIFFDURATION_URA	1,462	0.730	0.444	0.000	0.000	1.000	1.000	1.000
Control variables: CEO characteristics and CEO cash and equity compensation								
ln(*TENURE*)	1,462	1.692	0.842	0.000	1.099	1.792	2.303	3.091
ln(*SALARY*)	1,462	6.717	0.402	5.994	6.465	6.746	6.999	7.322
ln(*BONUS*)	1,462	1.530	2.714	0.000	0.000	0.000	2.446	7.340
DELTA	1,462	0.122	0.209	0.009	0.026	0.054	0.122	0.513
VEGA	1,462	252.4	361.1	4.491	38.62	105.6	304.9	1,134
Control variables: Loan characteristics								
ln(*AMOUNT*)	1,462	19.64	1.331	17.37	18.83	19.67	20.62	21.68
ln(*MATURITY*)	1,462	3.813	0.654	2.485	3.871	4.094	4.094	4.382
N_BANK	1,462	10.10	8.162	1.000	5.000	8.000	14.00	25.00
IB	1,462	0.072	0.258	0.000	0.000	0.000	0.000	1.000
USBANK	1,462	0.859	0.348	0.000	1.000	1.000	1.000	1.000
FRBANK	1,462	0.200	0.400	0.000	0.000	0.000	0.000	1.000
Control variables: Borrowing firm characteristics								
ln(*MVE*)	1,462	8.163	1.516	5.860	7.099	8.022	9.237	10.95
ROA	1,462	0.072	0.063	−0.022	0.036	0.065	0.107	0.179
BM	1,462	0.424	0.230	0.123	0.256	0.381	0.557	0.842
LEV	1,462	0.244	0.150	0.003	0.129	0.234	0.343	0.524
TANGIBILITY	1,462	0.319	0.234	0.049	0.130	0.250	0.492	0.799
SIGMAOCF	1,462	0.043	0.033	0.010	0.020	0.034	0.056	0.111
ALTMANZ	1,462	3.735	2.114	0.513	2.093	3.935	4.968	7.155
Instrumental variable: State maximum personal tax rates								
TAXRATE_WAGE	1,460	4.760	3.256	0.000	3.000	5.300	6.870	9.860
TAXRATE_GAIN	1,460	4.651	3.358	0.000	2.700	5.000	6.870	9.860
TAXRATE_MORT	1,460	3.020	3.571	0.000	0.000	0.000	5.750	9.300

Table 2 presents results of ordinary least squares (OLS) estimation. With *SPREAD* as the dependent variable (column (1)), the coefficient on *RLEV* is negative and significant at <1% level, indicating that private lenders accept lower promised yield when borrowing firms' CEOs have higher relative leverage. The economic significance is modest—increasing *RLEV* from the 25th to 75th percentile reduces the spread by two basis points over LIBOR. This corresponds to a saving in borrowing cost of approximately $157,400 per year, based on the average loan size in our sample ($787 m). To compare, increasing firm leverage (*LEV*) from the 25th to 75th percentile affects the spread by about 25 basis points over LIBOR. Untabulated tests show that the effect is more relevant for high-default-risk firms, presumably because stockholder–debtholder conflicts intensify as firms approach default. For firms with below-investment-grade credit rating (or below-sample median Altman *Z* score), increasing *RLEV* from the 25th to 75th percentile reduces *SPREAD* by 12.2 (3.9) basis points over LIBOR.

Column (2) presents *COVENANT* results. As covenants are usually contracted at the package level, we retain only the largest facility from each package.[9] The coefficient on *RLEV* is again negative and significant at <5% level, consistent with private lenders imposing fewer covenants when borrowing firms' CEOs have higher relative leverage. Using ordered probit to account for the discrete nature of *COVENANT* yields consistent results, shown in column (3).

[9] *COVENANT* and *SPREAD* are admittedly jointly determined. Lacking plausible instruments, we control for *COVENANT* in *SPREAD* models and for *SPREAD* in *COVENANT* models; our inferences hold.

Table 2 Average Effect of CEO Debt-Like Compensation on Loan Contract Terms: OLS Estimation

Dependent variable:	(1) OLS *SPREAD*	(2) OLS *COVENANT*	(3) Ordered-probit *COVENANT*
RLEV	**−0.019*****	**−0.018****	**−0.029****
	(0.007)	(0.008)	(0.012)
ln(*TENURE*)	**−0.029**	**0.062**	**0.068**
	(0.038)	(0.044)	(0.047)
ln(*SALARY*)	**0.162**	**−0.091**	**−0.060**
	(0.157)	(0.125)	(0.141)
ln(*BONUS*)	**0.002**	**−0.019***	**−0.028****
	(0.011)	(0.011)	(0.013)
DELTA	**−0.023**	**0.002**	**0.034**
	(0.112)	(0.156)	(0.171)
VEGA	**0.014**	**−0.044**	**−0.129**
	(0.119)	(0.105)	(0.146)
ln(*AMOUNT*)	**−0.158*****	**0.026**	**0.038**
	(0.037)	(0.037)	(0.048)
ln(*MATURITY*)	**0.040**	**−0.039**	**−0.062**
	(0.051)	(0.050)	(0.060)
N_BANK	**−0.003**	**0.039*****	**0.046*****
	(0.004)	(0.004)	(0.005)
IB	**0.712*****	**0.199**	**0.227**
	(0.158)	(0.159)	(0.167)
USBANK	**−0.581*****	**−0.023**	**−0.012**
	(0.135)	(0.106)	(0.123)
FRBANK	**−0.023**	**−0.048**	**−0.072**
	(0.093)	(0.081)	(0.094)
ln(*MVE*)	**−0.151*****	**−0.378*****	**−0.451*****
	(0.051)	(0.046)	(0.059)
ROA	**−1.507***	**−0.801**	**−0.765**
	(0.780)	(0.727)	(0.741)
BM	**0.364****	**−0.425****	**−0.508*****
	(0.170)	(0.180)	(0.195)
LEV	**1.153*****	**−0.300**	**−0.392**
	(0.280)	(0.298)	(0.317)
TANGIBILITY	**0.153**	**−0.139**	**−0.182**
	(0.222)	(0.197)	(0.212)
SIGMAOCF	**3.507*****	**−0.195**	**0.074**
	(1.187)	(1.311)	(1.414)
ALTMANZ	**−0.020**	**0.030**	**0.026**
	(0.020)	(0.025)	(0.026)
Intercept	**4.058*****	**4.436*****	Not reported
	(1.027)	(0.930)	for parsimony
Year and industry fixed effects	Yes	Yes	Yes
Number of observations	1,462	1,267	1,267
Adjusted R^2	0.402	0.290	0.127 (Pseudo)

Notes. Column (1) presents the OLS regression results with all-in-drawn spread (*SPREAD*) as the dependent variable. Columns (2) and (3) present the OLS and ordered-probit regression results with number of restrictive covenants (*COVENANT*) as the dependent variable. Variable definitions are provided in Appendix A. The coefficients on *VEGA* are multiplied by 1,000 for ease of presentation. Coefficient estimates on year and industry fixed effects are not reported for brevity. Robust standard errors, adjusted for heteroskedasticity and clustered by firm, are reported in parentheses.

*, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively, based on two-tailed *t*-tests.

Coefficients on control variables are mostly consistent with prior research. Bonuses (ln(*BONUS*)) are negatively associated with covenant usage. Smaller loans (ln(*AMOUNT*)) and loans arranged by investment banks (*IB*) have higher spreads, although larger syndicates (*N_BANK*) write more covenants. Firms with higher growth opportunities (lower *BM*) have lower spread but more covenants. Smaller firms (ln(*MVE*)), firms with higher leverage (*LEV*), and more volatile operating cash flows (*SIGMAOCF*) have higher spreads.[10] In addition, although the insignificant coefficient on the Altman *Z* score (a proxy for distress risk) appears surprising, we find (in untabulated results) a negative and significant coefficient, consistent with expectation after excluding leverage (*LEV*) and/or profitability (*ROA*)—both components of the Altman *Z* score—from the model. We retain *LEV* to facilitate the interpretation of economic significance of *RLEV*, and *ROA* to capture any additional effect of performance on loan terms beyond what is captured in the Altman *Z* score (as in, e.g., Graham et al. 2008).

3.2. Identification Strategy

Compensation contracts and debt contracts are endogenously determined. Certain omitted variables may correlate with both, leading to a spurious relation between debt-like compensation and loan terms. We address endogeneity concerns with an IV approach.

3.2.1. State Personal Tax Rates as an Instrument for Relative Leverage. Anecdotal evidence suggests that providing tax-planning options to executives is an important consideration for compensation committees. For instance, Ford Motor Co. states in its 2007 proxy statement: "Under our Deferred Compensation plan, certain salaried employees may defer up to… This unfunded plan provides the opportunity to save for the future, while postponing payment of income taxes on the deferred compensation." Because pension and ODC plans allow executives to defer income and the associated tax burden to a later period and the benefit from deferring tax payments increases with the CEO's marginal tax rate (Scholes et al. 2002, Kim and Lu 2011), we propose the personal tax rate of the state in which the firm is headquartered as an instrument for the CEO's willingness to accept deferred compensation and, hence, for *RLEV*.

The tax benefits to deferring income come from two sources. First, the executive postpones tax payment to a later period, reducing the present value of her tax

[10] We also control for sample firms' access to the public debt market, with an indicator set to one if the firm has at least one bond issuance over the past three years and zero otherwise (e.g., Santos and Winton 2008). Our results remain robust to including this indicator, and this indicator itself is insignificant in all models.

liability. Second, the deferred income may eventually be taxed at a lower rate in retirement. Because most CEOs are likely to remain in the highest tax bracket even after they retire, the second benefit is less applicable. Executives may, however, still benefit if they defer compensation in a high-income-tax state and then move after retirement to a low- or no-income-tax state such as Florida (Bruce et al. 2010, Chason 2006). Furthermore, the State Taxation of Pension Income Act (1995) provides that states may not tax deferred compensation-based retirement income of a nonresident that is paid periodically over the beneficiaries' life expectancy or at least over 10 years, effectively allowing relocation from a high-income-tax state to a low-income-tax state and avoidance of taxation on deferred income by the high-income-tax state.

The two-stage instrumental variable model is specified as follows:

First stage: $RLEV_{i,t}$

$$= \alpha_0 + \alpha_1 \mathrm{IV}_t + \sum_{q=2}^{m} \alpha_q (q\text{th Control Variable}) + \varepsilon_{i,t}, \quad (2)$$

Second stage: $SPREAD_{i,t}(COVENANT_{i,t})$

$$= \alpha_0 + \alpha_1 FIT\_RLEV_{i,t} + \sum_{q=2}^{m} \alpha_q (q\text{th Control Variable}) + \varepsilon_{i,t}. \quad (3)$$

We estimate these equations with two-stage least squares (2SLS), with the same control variables as in Equation (1). In the first-stage regression, the IV includes the maximum tax rate for wages (*TAXRATE_WAGE*) and for long-term capital gains (*TAXRATE_GAIN*) and the maximum mortgage subsidy rate (*TAXRATE_MORT*) of the state where the firm is headquartered. We assume that the state in which the firm is headquartered adopts either residence tax jurisdiction if the CEO resides in the state or source tax jurisdiction if the CEO resides in another state.[11] We expect CEO relative leverage to be positively associated with *TAXRATE_WAGE* and *TAXRATE_GAIN* and negatively associated with *TAXRATE_MORT* because the mortgage subsidy reduces the CEO's overall tax burden.

[11] When the CEO lives and works in different states, she typically ends up paying the higher rate of the two states. Hence, our assumption that the CEO lives in the state where the firm is headquartered gives us a lower bound on the applicable personal tax rate. The IV is thus subject to measurement error if the CEO chooses to live in a state that levies higher tax rates than the state where her firm headquarters. To evaluate measurement error, we identify firms located within 25 miles from a state border (for which measurement error is more likely) using the data and methods in Holmes (1998). For such firms, we replace personal tax rates with those of the bordering state, if those rates are higher. Even though the adjustment changes personal tax rates for about 25% of the sample, the instrument continues to be correlated to *RLEV*, and the documented results persist in the second stage.

Table 3 **Average Effect of CEO Debt-Like Compensation on Loan Contract Terms: 2SLS Estimation Using State Maximum Individual Tax Rates as an Instrumental Variable**

Dependent variable:	(1.1) 1st stage *RLEV*	(1.2) 2nd stage *SPREAD*	(2.1) 1st stage *RLEV*	(2.2) 2nd stage *COVENANT*
TAXRATE_WAGE	**0.285****		**0.316****	
	(0.128)		(0.147)	
TAXRATE_GAIN	−**0.073**		−**0.064**	
	(0.119)		(0.129)	
TAXRATE_MORT	−**0.219*****		−**0.281*****	
	(0.058)		(0.073)	
FIT_RLEV		−**0.158*****		−**0.134****
		(0.063)		(0.060)
Control variables	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes
Number of observations	1,460	1,460	1,265	1,265
Adjusted R^2	0.139	0.231	0.149	0.160
Underidentification test: Kleibergen–Paap LM stat.: p-value of χ^2 (3)	0.00		0.00	
Overidentification test of all IVs: Hansen J-stat.: p-value of χ^2 (2)		0.72		0.28

Notes. Columns (1.1) and (1.2) present the regression results of the 2SLS estimation with all-in-drawn spread (*SPREAD*) as the dependent variable in the second stage. Columns (2.1) and (2.2) present the regression results of the 2SLS estimation with number of restrictive covenants (*COVENANT*) as the dependent variable in the second stage. Variable definitions are provided in Appendix A. Coefficient estimates on control variables, year, and industry fixed effects are not reported for brevity. Robust standard errors, adjusted for heteroskedasticity and clustered by firm, are reported in parentheses. LM, Lagrange multiplier.

** and *** indicate significance levels at 5% and 1%, respectively, based on two-tailed t-tests.

3.2.2. Instrument Validation and 2SLS Estimation. To qualify as an instrument, state personal tax rates must satisfy the dual criteria of relevance (i.e., correlate with relative leverage) and exogeneity (i.e., not directly affect loan terms other than through relative leverage). Table 3 reports the 2SLS results on *SPREAD* and *COVENANT*. In the first-stage regressions, *RLEV* is significantly positively (negatively) related to *TAXRATE_WAGE* (*TAXRATE_MORT*), consistent with our intuition that CEOs facing higher effective tax rates are willing to defer more compensation. Importantly, the underidentification test strongly rejects the null of no correlation between the IV and *RLEV*. Furthermore, the Cragg–Donald F-statistic for the IV is 9.29 (9.78) in the *SPREAD* (*COVENANT*) test, higher than the Stock and Yogo (2005) critical value of 9.08 for a maximal relative bias in the IV estimation of 10%, compared with OLS. We conclude from these statistics that the IV is relevant. Although IV exogeneity cannot be conclusively tested, the Hansen's *J*-statistic for the test of overidentifying restrictions is insignificant at $p = 0.72$ ($p = 0.28$) for the *SPREAD* (*COVENANT*) test. This provides some comfort that, assuming that one of the tax rates is a valid IV, we cannot reject the null of no correlation between the other two tax rates and 2SLS residuals.

In the second stage, the coefficient on fitted relative leverage (*FIT_RLEV*) is negative and significant in both *SPREAD* and *COVENANT* tests. Overall, these results show a negative causal effect from CEO relative leverage to loan spreads and covenant usage, consistent with debtholders recognizing an incentive-alignment effect from pension and ODC plans and adjusting debt contracts accordingly. Interestingly, the economic significance of the effect is much larger in 2SLS than in OLS. Assuming that the IV is valid, this indicates that there may be attenuation bias in OLS tests because of measurement error. Alternatively, there could exist omitted variables that, by virtue of being positively correlated with both *RLEV* and *SPREAD*/*COVENANT*, work *against* finding the predicted negative effect. One such force could be CEOs' private expectations of future performance and growth opportunities. CEOs with favorable expectations would prefer to hold their firms' equity rather than debt because their information advantage is more valuable when holding the most information-sensitive security (equity). This, in turn, leads to lower *RLEV*. The favorable prospects may become evident to private lenders from their due diligence, leading to lower spreads and fewer covenants.[12] Another force relates to CEOs' firm-specific human capital, which we do not observe. Pensions often serve to bond CEOs to firms (Sundaram and Yermack 2007) because vesting restrictions ensure that some benefits are lost from voluntary turnover. When managers have substantial firm-specific human capital (and hence fewer outside opportunities, per Custodio et al. 2013), bonding needs may be lower, leading to lower *RLEV*; such managers are also believed to make more conservative investing and financing decisions (e.g., Agrawal and Mandelker 1987), leading to lower spreads and fewer covenants.

3.2.3. Challenges to the IV Approach: Local Ownership. A key challenge to using state personal tax rates as the IV arises from the fact that personal taxes could affect firm financing decisions through the personal tax penalty on holding debt versus equity instruments (Miller 1977, Graham 1999). The personal tax penalty exists because investors in debt securities receive returns in the form of interest (typically taxed at the same rate as ordinary income), whereas equity investors receive returns in the form of dividends and capital gains and may be taxed at lower rates (for example, qualified dividends and long-term capital gains). This leads investors to demand a higher risk-adjusted return for holding debt versus equity and, in turn, reduces the use of debt by firms.

If firms' investor bases are highly localized within their states of operation, then all else being equal, we would expect firms located in states with higher personal tax penalties from state taxes to systematically use less debt than firms located in states with lower personal tax penalties from state taxes, raising concerns about the validity of the IV. We evaluate this possibility by extending Graham (1999), who documents that corporate leverage is lower when firms' investors bear a higher personal tax penalty from *federal* taxation. We construct a measure of the personal tax penalty from *state* taxation and augment the Graham (1999) model to test whether the state-level personal tax penalty significantly affects corporate leverage in our sample. The results, tabulated in Appendix B, show that corporate leverage is significantly positively (negatively) associated with corporate marginal tax rates (the federal personal tax penalty), consistent with Graham (1999). However, corporate leverage is insignificantly associated with the state personal tax penalty. The coefficient on the state personal tax penalty remains insignificant after excluding the federal personal tax penalty (untabulated). This suggests that the ownership of our sample firms is not sufficiently localized within states or that variation across states in the relative tax rates applicable to different forms of investment income is not significant enough to induce a state personal tax penalty on corporations' use of debt.

Another challenge to the IV that derives from local ownership relates to firms located in states with a high concentration of money managers or wealthy individuals (such as New York and Massachusetts, per Coval and Moskowitz 1999). As geographic proximity mitigates information asymmetry, firms located in these states could face a lower cost of equity because they have a deep local base of potential equity investors. The lower cost of equity (relative to debt) could result in lower corporate leverage and correspondingly higher *RLEV*, ceteris paribus. If these states also have high personal tax rates (e.g., New York's top marginal rate of 9% is among the highest in the country), we may observe a spurious positive correlation between state personal tax rates and *RLEV* that is unrelated to executives' incentives to defer compensation. We address this concern in two

[12] Positive information about future opportunities need not lower spreads for financially sound firms; this effect will be driven by marginal firms with future cash flows that are still uncertain enough that this incremental information makes a difference to loan terms.

Table 4 **Average Effect of CEO Debt-Like Compensation on Loan Contract Terms: 2SLS Estimation Using State Maximum Individual Tax Rates as an Instrumental Variable, Controlling for the Prevalence of Local Wealthy Individuals, Firm Marginal Tax Rates, and State Maximum Corporate Tax Rates**

Dependent variable:	(1.1) 1st stage *RLEV*	(1.2) 2nd stage *SPREAD*	(2.1) 1st stage *RLEV*	(2.2) 2nd stage *COVENANT*	(3.1) 1st stage *RLEV*	(3.2) 2nd stage *SPREAD*	(4.1) 1st stage *RLEV*	(4.2) 2nd stage *COVENANT*
TAXRATE_WAGE	**0.288****		**0.322****		**0.291****		**0.331****	
	(0.128)		(0.147)		(0.130)		(0.148)	
TAXRATE_GAIN	−**0.073**		−**0.065**		−**0.072**		−**0.063**	
	(0.119)		(0.129)		(0.118)		(0.126)	
TAXRATE_MORT	−**0.218*****		−**0.279*****		−**0.225*****		−**0.291*****	
	(0.058)		(0.073)		(0.058)		(0.072)	
PCT_RICH	**6.595**	−**0.067**	**12.116**	**4.789**				
	(9.966)	(2.898)	(12.834)	(3.935)				
STATE_CORPTAX					**0.026**	−**0.028**	**0.069**	−**0.001**
					(0.038)	(0.017)	(0.051)	(0.021)
FIRM_MARGTAX					−**0.046**	−**0.003**	−**0.114**	−**0.013**
					(0.046)	(0.011)	(0.078)	(0.015)
FIT_RLEV		−**0.159****		−**0.134****		−**0.155*****		−**0.126****
		(0.064)		(0.061)		(0.062)		(0.057)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,460	1,460	1,265	1,265	1,460	1,460	1,265	1,265
Adjusted R^2	0.139	0.228	0.150	0.164	0.140	0.238	0.155	0.179

Notes. Columns (1.1) and (1.2) ((2.1) and (2.2)) present the regression results of the 2SLS estimation with all-in-drawn spread (*SPREAD*) (number of restrictive covenants (*COVENANT*)) as the dependent variable in the second stage, controlling for the percentage of rich individuals in a state *PCT_RICH*. Columns (3.1) and (3.2) ((4.1) and (4.2)) present the regression results of the 2SLS estimation with all-in-drawn spread (*SPREAD*) (number of restrictive covenants (*COVENANT*)) as the dependent variable in the second stage, controlling for state maximum corporate tax rates (*STATE_CORPTAX*) and firm marginal tax rates (*FIRM_MARGTAX*). Variable definitions are provided in Appendix A. Coefficient estimates on control variables, year, and industry fixed effects are not reported for brevity. Robust standard errors, adjusted for heteroskedasticity and clustered by firm, are reported in parentheses.

** and *** indicate significance levels at 5% and 1%, respectively, based on two-tailed t-tests.

ways. First, we repeat the 2SLS tests with an additional control for the prevalence of wealthy individuals in the state (*PCT_RICH* to proxy for the local equity investor base), using state-level IRS tax summary data, and report results in models (1.1/1.2)–(2.1/2.2) of Table 4. The results hold after controlling for *PCT_RICH*, which is itself insignificant. Second, we rerun 2SLS tests removing firms headquartered in New York and Massachusetts and find that the results continue to hold.

3.2.4. Other Challenges to the IV Approach. *Corporate* tax rates can also affect firms' leverage choices (e.g., Modigliani and Miller 1958) and hence *RLEV*. If state personal and corporate tax rates are correlated, higher state personal tax rates could correlate with firm leverage and thereby correlate with loan terms. We find a significant Pearson correlation of 0.634 between maximum personal and corporate tax rates at the state level and, hence, include the state maximum corporate tax rate as an additional control in 2SLS. Firm-level marginal tax rates may also need to be considered, if correlated with state personal tax rates. A firm's marginal tax rate not only affects its choice of leverage (e.g., Graham 1996a) but could also diminish its incentives to award deferred compensation. Although deferring compensation benefits executives by postponing their tax payment, the firm bears the increased tax liability from not being able to deduct compensation expense from current period income (Bebchuk and Fried 2004).

In models (3.1/3.2)–(4.1/4.2) in Table 4, we include the state maximum corporate tax rate (*STATE_CORPTAX*) as stipulated in annual state tax rate tables, and the firm-level marginal tax rate before interest deductions (*FIRM_MARGTAX*) from Blouin et al. (2010) as additional control variables in 2SLS estimation. In the first stage, we find an insignificant coefficient on both *STATE_CORPTAX* and *FIRM_MARGTAX*. In the second stage, we continue to find a significantly negative coefficient on the fitted value of CEO relative leverage.

Finally, the federal government's action to stimulate the economy might involve reductions in interest rates (which affect firm-level yields) along with reductions in federal personal tax rates and possibly in state personal tax rates too. In untabulated tests, we estimate the 2SLS regressions after controlling for the mean or median of the daily federal funds rate (averaged over individual firms' fiscal years). We observe an insignificant coefficient on the federal funds rate, and the main results are virtually unchanged.

Table 5 **Effects of Different Forms of CEO Debt-Like Compensation on Loan Contract Terms: Decomposing Debt-Like Compensation into Pensions and ODC and Decomposing Pensions Further into Rank-and-File Plans and SERP Plans**

Dependent variable:	(1) OLS *SPREAD*	(2) OLS *COVENANT*	(3) Ordered-probit *COVENANT*	(4) OLS *SPREAD*	(5) OLS *COVENANT*	(6) Ordered-probit *COVENANT*
RLEV_PEN	−**0.026*****	−**0.025****	−**0.040*****			
	(0.009)	(0.012)	(0.015)			
RLEV_RAF				−**0.018**	−**0.013**	−**0.016**
				(0.014)	(0.017)	(0.017)
RLEV_SERP				−**0.024****	−**0.023***	−**0.043****
				(0.011)	(0.013)	(0.021)
RLEV_ODC	−**0.011**	−**0.009**	−**0.017**	**0.007**	**0.010**	−**0.016**
	(0.009)	(0.014)	(0.020)	(0.015)	(0.017)	(0.031)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,462	1,267	1,267	777	712	712
Adjusted R^2	0.402	0.291	0.127 (pseudo)	0.421	0.318	0.150 (pseudo)

Notes. Column (1) presents OLS regression results with all-in-drawn spread (*SPREAD*) as the dependent variable, decomposing debt-like compensation into pensions and ODC. Columns (2) and (3) present OLS and ordered-probit regression results with number of restrictive covenants (*COVENANT*) as the dependent variable, decomposing debt-like compensation into pensions and ODC. Column (4) presents OLS regression results with all-in-drawn spread (*SPREAD*) as the dependent variable, decomposing debt-like compensation into RAF plans, SERP plans, and ODC plans. Columns (5) and (6) present OLS and ordered-probit regression results with number of restrictive covenants (*COVENANT*) as the dependent variable, decomposing debt-like compensation into RAF plans, SERP plans, and ODC plans. Columns (4)–(6) are based on the subsample of firms with nonzero balance in defined benefit pension plans for their CEOs. Variable definitions are provided in Appendix A. Coefficient estimates on control variables, year, and industry fixed effects are not reported for brevity. Robust standard errors, adjusted for heteroskedasticity and clustered by firm, are reported in parentheses.

*, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively, based on two-tailed t-tests.

4. The Implications of Institutional Features of Debt-Like Compensation

4.1. Are All Pensions and ODC Truly Debt-Like?

The theoretical prediction of incentive alignment from inside debt relies on the premise that the payoffs to inside debt resemble the payoffs to unsecured corporate debt. Although ODC plans share many debt-like features with pension plans, the fact that these balances are often invested in firms' own equity and can be withdrawn flexibly over short periods, could mute their ability to align CEO incentives with outside lenders' incentives. To evaluate further, we re-estimate Equation (1) disaggregating CEO relative leverage (*RLEV*) into pension-based relative leverage (*RLEV_PEN*) and ODC-based relative leverage (*RLEV_ODC*). Models (1)–(3) of Table 5 report the results. In both *SPREAD* and *COVENANT* specifications, *RLEV_PEN* is negative and significant, while *RLEV_ODC* is insignificant. Hence, although private lenders perceive pension plans as an incentive alignment mechanism, they do not appear to perceive the same of ODC plans, which account for about half of all debt-like compensation.

Pension balances, in turn, could derive from RAF plans or SERPs. RAF plan balances in the U.S., on account of being funded, secured and guaranteed by the PBGC, may not be subject to substantial risk of loss in insolvency. To evaluate further, we hand-collect data on pension balances accrued under RAF and SERP plans from proxy statements, and decompose pension-based relative leverage (*RLEV_PEN*) into RAF-based relative leverage (*RLEV_RAF*) and SERP-based relative leverage (*RLEV_SERP*). As shown in models (4)–(6) of Table 5, *RLEV_RAF* is insignificant in both *SPREAD* and *COVENANT* tests, while *RLEV_SERP* is negative and significant. The incentive alignment from pensions hence appears to be driven entirely by SERPs, which most closely resemble unsecured corporate debt in payoffs. Pairwise t tests for differences between coefficients indicate that the effect of SERPs on both *SPREAD* and *COVENANT* is significantly more negative than the effect of ODC plans.[13]

Overall, Table 5 shows that private lenders perceive each form of debt-like compensation differently. The average value of ODC relative to total debt-like compensation is 51% and that of RAF pensions is 6%; lenders hence do not perceive significant incentive alignment from an economically significant portion of all debt-like compensation. To address endogeneity in the OLS results, we perform 2SLS estimation using the IV from Tables 3 and 4 but with each component of debt-like compensation (*RLEV_RAF*,

[13] The p-value for tests of $RL\_SERP < RL\_ODC$ in *SPREAD* (*COVENANT*) tests is $p = 0.07$ ($p = 0.09$). The p-value for tests of $RL\_RAF < RL\_ODC$ in *SPREAD* (*COVENANT*) tests is $p = 0.10$ (insignificant).

Table 6 Effects of Different Forms of CEO Debt-Like Compensation on Loan Contract Terms: 2SLS Estimation Using State Maximum Personal Tax Rates as an Instrumental Variable

First stage: Dependent variable:	(A1.1) *RLEV_RAF*	(A2.1) *RLEV_SERP*	(A3.1) *RLEV_ODC*	(B1.1) *RLEV_RAF*	(B2.1) *RLEV_SERP*	(B3.1) *RLEV_ODC*
TAXRATE_WAGE	**0.082**	**−0.092**	**0.103***	**0.095**	**−0.038**	**0.133**
	(0.077)	(0.082)	(0.062)	(0.082)	(0.096)	(0.085)
TAXRATE_GAIN	**−0.079**	**0.175****	**−0.013**	**−0.089**	**0.157***	**−0.024**
	(0.090)	(0.069)	(0.039)	(0.093)	(0.080)	(0.042)
TAXRATE_MORT	**−0.005**	**−0.046**	**−0.095****	**−0.008**	**−0.105****	**−0.123***
	(0.021)	(0.038)	(0.037)	(0.022)	(0.046)	(0.063)
Adjusted R^2	0.112	0.137	0.248	0.127	0.142	0.281
Kleibergen–Paap LM stat: p-value of χ^2 (3)	0.48	0.02	0.07	0.41	0.01	0.01
Second stage: Dependent variable:	(A1.2) *SPREAD*	(A2.2) *SPREAD*	(A3.2) *SPREAD*	(B1.2) *COVENANT*	(B2.2) *COVENANT*	(B3.2) *COVENANT*
FIT_RLEV_RAF	**0.104**			**−0.145**		
	(0.618)			(0.391)		
FIT_RLEV_SERP		**−0.268****			**−0.243***	
		(0.136)			(0.133)	
FIT_RLEV_ODC			**−0.411**			**−0.427**
			(0.312)			(0.279)
Control variables (both stages)	Yes	Yes	Yes	Yes	Yes	Yes
Year and industry fixed effects (both stages)	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	776	776	776	711	711	711
R^2	0.393	0.140	0.239	0.296	0.066	0.314
Hansen J-stat.: p-value of χ^2 (2)	0.00	0.14	0.62	0.01	0.13	0.97

Notes. Columns (A1.1)–(A3.1) ((B1.1)–(B3.1)) present the first-stage regression results of the 2SLS estimation with all-in-drawn spread (*SPREAD*) (number of restrictive covenants (*COVENANT*)) as the dependent variable in the second stage. Columns (A1.2)–(A3.2) ((B1.2)–(B3.2)) present the corresponding second-stage regression results. Variable definitions are provided in Appendix A. The analyses are based on the subsample of firms with nonzero balance in defined benefit pension plans reported for their CEOs. Coefficient estimates on control variables, year, and industry fixed effects are not reported for brevity. Robust standard errors, adjusted for heteroskedasticity and clustered by firm, are reported in parentheses. LM, Lagrange multiplier.

* and ** indicate significance levels at 10% and 5%, respectively, based on two-tailed t-tests.

RLEV_SERP, and *RLEV_ODC*) as explanatory variables. Table 6 reports the results. Consistent with the OLS results, *FIT_RLEV_SERP* remains negative and significant in both *SPREAD* and *COVENANT* tests, while *FIT_RLEV_RAF* and *FIT_RLEV_ODC* continue to be insignificant.[14] In untabulated tests, we repeat the robustness checks from §§3.2.3 and 3.2.4 with *RLEV_SERP* as the variable of interest. We conclude that the incentive-alignment effect from SERPs is unlikely to be explained by local ownership, corporate marginal tax rates, state maximum corporate tax rates, or federal-level interest rates.

To further understand the effect of ODC plans, we hand collect data from proxy statements on ODC balances invested in firms' own equity and create two alternative measures of ODC-based relative leverage by subtracting the portion invested in firm equity from the total balance in ODC plans. Because proxy disclosures often mention the presence of firm equity in ODC plans but do not provide the exact amount, we assume first for these firms that the portion of ODC balances invested in firm equity approximates the sample mean of 55% based on the subsample of observations with complete disclosure (*RLEV_ODC_Adj1*) and second that the portion of ODC balances invested in firm equity is 100% (*RLEV_ODC_Adj2*).[15] When we replace *RLEV_ODC* with *RLEV_ODC_Adj1* or *RLEV_ODC_Adj2*, we continue to observe insignificant coefficients on these adjusted measures that attempt to isolate ODC balances that are more purely debt-like in payoffs. This tentatively suggests that the insignificant effect of ODC plans is not entirely attributable to their being invested in firm equity, leaving the possibility that the flexibility in withdrawing ODC balances (and their

[14] The instrument is not relevant in *RLEV_RAF* models. This is consistent with our understanding of rank-and-file plans as being broad-based plans extended to (almost) all employees; accruals under these plans are mostly determined by company-wide policies and formulae rather than discretionary election by the executive.

[15] When the proxy explicitly mentions the ODC balance invested in firm equity, ExecuComp already includes this amount in the executive's equity holding. In these cases, we make no adjustment to CEO equity holding. When the proxy mentions equity investment through the ODC plan without any clear amount, we subtract the assumed amounts from the ODC balance and add them back to the inside equity balance.

resulting effective seniority to outside lenders' claims) may be nullifying any incentive alignment arising from their debt-like payoffs. We cannot test this possibility directly because firms rarely disclose ODC plan withdrawal schedules.

Although we attribute ODC plans' lack of incentive-alignment effect to their non-debt-like features, it is also possible that opaque disclosures about these plans lead to high information asymmetry between private lenders and firms, inducing private lenders to discount any incentives derived from these plans while making lending decisions, even if these plans are truly debt-like. In untabulated tests, we attempt to distinguish between "ODC-transparent" firms (those that provide at least some disclosures about ODC investment and withdrawal terms) and "ODC-opaque" firms, using the public disclosures available in proxy statements. We fail to find a significant incentive-alignment effect from ODC balances even within ODC-transparent firms. We cannot, however, conclude from this test that information asymmetry effects are not present or not important because our measures of disclosure transparency are limited and noisy and because the opacity of public disclosures does not necessarily translate into high information asymmetry for *private* lenders, who may have access to inside information. We highlight this as an interesting and important area for future research, particularly if disclosures of ODC plan features should improve, to further our understanding of the effects of ODC plans.

4.2. Does Seniority of Debt-Like Compensation Matter?

Debt-like compensation, besides taking different forms, could have varying payment schedules that cause its effective seniority to differ significantly from that of outside debt. Considerable cross-sectional differences exist not only across SERPs and ODC plans, but also within SERPs, in the effective seniority of debt-like compensation vis-à-vis outside debt. For instance, SERPs often contain special arrangements such as lump-sum withdrawal options, which by allowing CEOs to withdraw their claims shortly after retirement, could render SERP claims senior to outside debtholders' claims and hence weaken their incentive alignment potential.

Although the true seniority of debt-like compensation is unobservable, we focus on one key aspect of seniority—the duration of debt-like compensation relative to outside debt—and attempt to capture it in a single measure. Cross-sectional variation in the duration of debt-like compensation arises from CEOs' time to retirement (which depends on current CEO age and firm retirement age policies), the form of payment of the benefit (in a single lump sum at retirement, or as a life annuity), and for life annuities, assumptions on life expectancy (which depends on gender, retirement age, and year of retirement). We first hand collect two measures of CEO retirement age from proxy statements: the normal retirement age (*NRA*) and the earliest age at which the CEO can retire and claim an unreduced benefit (*URA*). We then combine retirement age data, disclosures on current SERP balances and pension discount rates, and published life expectancy tables to estimate the Macaulay duration (e.g., Weil 1973) for each SERP, which reflects the weighted-average time to maturity of SERP cash flows. We hand collect data on SERP lump-sum payout options from proxy statements, and for SERPs with lump-sum options (44% of the SERP sample), we calculate duration assuming that the entire SERP balance is paid one year after retirement.[16] Given the vague and incomplete disclosures of ODC plans' withdrawal terms, we make a similar, simplifying assumption for ODC plans, which is also consistent with survey evidence showing that virtually all ODC plans have lump-sum withdrawal options (Clark Consulting 2009). For firms with both SERPs and ODC plans, we compute an overall duration of debt-like claims by weighting the duration of SERPs and ODC plans by their accrued balances. We explain the procedures in detail in Appendix A.

We then construct an indicator variable (*DIFFDURATION*) set to one if the duration of CEO debt-like compensation is longer than outside loan maturity and to zero if otherwise (or if a firm does not grant debt-like compensation). We use loan maturity to proxy for loan duration because the detailed payment schedules required to calculate loan duration are largely unavailable in DealScan. We run these calculations separately for both retirement age measures to estimate two indicators *DIFFDURATION_NRA* and *DIFFDURATION_URA*. *DIFFDURATION_NRA* (*DIFFDURATION_URA*) has a mean value of 0.734 (0.730),[17] suggesting that on average

[16] The presence of lump-sum options is closely linked to the relative seniority of debt-like compensation because lump-sum options allow CEOs to withdraw pension benefits shortly after retirement, as opposed to over many years subsequently. In untabulated tests, we examine factors that determine the provision of lump-sum withdrawal options for SERPs. We find that SERPs with lump-sum options are more likely in financially constrained firms. Viewing such pensions as deferred salary, they could be optimal for financially constrained firms making a choice between paying salary now or postponing payment to a later date. We also find that SERPs with lump-sum options are more likely in firms with high growth opportunities (low *BM*) and in low-leverage firms. Because agency costs of equity may be more important than agency costs of debt in such firms (Edmans and Liu 2011), the need to mitigate agency costs of debt may not be of first-order importance in these firms, leading to pensions that are less debt-like.

[17] Mean (median) duration of debt-like compensation is 12.7 (12.4) years with *NRA* and 11.8 (11.3) years with *URA*.

Table 7 Average Effect of CEO Debt-Like Compensation on Loan Contract Terms: Incorporating the Duration of Debt-Like Compensation Relative to Loan Maturity

Dependent variable:	(1) OLS *SPREAD*	(2) OLS *SPREAD*	(3) Ordered-probit *COVENANT*	(4) Ordered-probit *COVENANT*
RLEV	**−0.016****	**−0.016****	**−0.030****	**−0.030****
	(0.006)	(0.006)	(0.012)	(0.012)
DIFFDURATION_NRA	**−0.205*****		**0.033**	
	(0.075)		(0.086)	
DIFFDURATION_URA		**−0.202*****		**0.028**
		(0.075)		(0.085)
Control variables	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes
Number of observations	1,462	1,462	1,267	1,267
Adjusted R^2	0.407	0.407	0.127 (pseudo)	0.127 (pseudo)

Notes. Columns (1) and (2) present the OLS regression results with all-in-drawn spread (*SPREAD*) as the dependent variable. Columns (3) and (4) present the ordered-probit regression results with number of restrictive covenants (*COVENANT*) as the dependent variable. All four columns include *DIFFDURATION_NRA* or *DIFFDURATION_URA* as an additional explanatory variable. Variable definitions are provided in Appendix A. Coefficient estimates on control variables, year, and industry fixed effects are not reported for brevity. Robust standard errors, adjusted for heteroskedasticity and clustered by firm, are reported in parentheses.

** and *** indicate significance levels at 5% and 1%, respectively, based on two-tailed t-tests.

CEO debt-like compensation has a longer duration than outside loans. We next examine whether and how the relative seniority of CEO debt-like compensation affects loan terms—i.e., do borrowers receive lower loan spreads and fewer covenants when debt-like compensation is of longer duration relative to outside debt?

Table 7 presents OLS results for the baseline model, incorporating *DIFFDURATION_NRA* and *DIFFDURATION_URA* alternatively. While these measures are insignificant in *COVENANT* models, we find, consistent with expectation, that *DIFFDURATION_NRA* and *DIFFDURATION_URA* are both negatively and significantly associated with loan spreads. Incentive-alignment effects are hence stronger when the duration of debt-like compensation is relatively long, even after controlling for its magnitude through *RLEV*, which remains negative and significant. We conclude that both the amount and the relative seniority of debt-like compensation claims affect the incentive-alignment perceived by outside debtholders.

In examining the effect of *DIFFDURATION* on loan terms, we acknowledge that the seniority of debt-like compensation may be endogenous. For example, CEOs may demand early retirement and lump-sum options when they are uncertain about the firms' long-term prospects (Wei and Yermack 2011); correspondingly, these firms may only be able to borrow at higher spreads, yielding a negative association of *DIFFDURATION* with loan spreads when credit risk and future prospects are not fully controlled for.

We posit that state personal tax rates serve as an instrument not only for the magnitude of debt-like compensation, as explained in §3.2, but also for its seniority. The features of the U.S. tax code are such that CEOs working in high-income-tax states have incentives not only to defer more compensation but also potentially to defer for longer periods of time. Consider one source of tax benefits from deferring income: being able to pay a potentially lower rate on income eventually received in retirement if the CEO defers compensation in a high-income-tax state and relocates in retirement to a low-income-tax state (State Taxation of Pension Income Act 1995). This benefit only applies if the income is received after the CEO is a resident of the low-income-tax state; an executive living and working in a higher-income-tax state therefore has an incentive to defer receipt to a later point in time if there is a possibility of relocating to a lower-income tax state. The higher the CEO's current state tax rate, the stronger this incentive because the reduction in tax rates from relocation is greater. Furthermore, the law allows relocation and avoidance of taxation in the high-income-tax state only if the deferred compensation is paid periodically over the beneficiaries' life expectancy or at least over 10 years, further reducing the incentive to demand immediate settlement through, for example, a lump-sum option.[18]

[18] This "periodic payment rule" applies only to payouts under plans that are strictly supplemental plans, as opposed to restoration plans. Payouts from restoration plans are exempt from taxation in the high-taxing state, even if paid as a lump sum, if CEOs relocate in retirement and become residents of the low-taxing state. For these plans, therefore, the law does not specifically incentivize CEOs against withdrawing as a lump sum; however, CEOs still retain the incentive to defer compensation at least to retirement, as long as there is a possibility of relocation.

Table 8 Average Effect of CEO Debt-Like Compensation on Loan Contract Terms: 2SLS Estimation Using State Maximum Individual Tax Rates as an Instrumental Variable, Incorporating the Duration of Debt-Like Compensation Relative to Loan Maturity

Dependent variable:	(1.1) 1st stage *DURATION_NRA*	(1.2) 2nd stage *SPREAD*	(2.1) 1st stage *DURATION_URA*	(2.2) 2nd stage *SPREAD*
TAXRATE_WAGE	**0.048*****		**0.045*****	
	(0.013)		(0.014)	
TAXRATE_GAIN	−**0.018**		−**0.016**	
	(0.012)		(0.011)	
TAXRATE_MORT	−**0.030*****		−**0.029*****	
	(0.008)		(0.008)	
FIT_DIFFDURATION_NRA		−**1.319*****		
		(0.444)		
FIT_DIFFDURATION_URA				−**1.390*****
				(0.478)
Control variables	Yes	Yes	Yes	Yes
Year and industry fixed effects	Yes	Yes	Yes	Yes
Number of observations	1,460	1,460	1,460	1,460
Adjusted R^2	0.199	0.247	0.192	0.222
Kleibergen–Paap LM stat.: p-value of χ^2 (3)	0.00		0.00	
Hansen J-stat.: p-value of χ^2 (2)	0.81		0.83	

Notes. Columns (1.1) and (1.2) ((2.1) and (2.2)) present the regression results of the 2SLS estimation with *DIFFDURATION_NRA* (*DIFFDURATION_URA*) as the dependent variable in the first stage and all-in-drawn spread (*SPREAD*) as the dependent variable in the second stage. Variable definitions are provided in Appendix A. Coefficient estimates on control variables, year, and industry fixed effects are not reported for brevity. Robust standard errors, adjusted for heteroskedasticity and clustered by firm, are reported in parentheses. LM, Lagrange multiplier.

***Indicates significance level at 1%, based on two-tailed t-tests.

Table 8 presents results of 2SLS estimation with *DIFFDURATION_NRA* (and alternatively, *DIFFDURATION_URA*) as the dependent variable in the first stage and *SPREAD* in the second stage. Consistent with our intuition, both *DIFFDURATION* measures are strongly positively (negatively) associated with *TAXRATE_WAGE* (*TAXRATE_MORT*). Furthermore, underidentification tests and Cragg–Donald F-tests add confidence that the IV is relevant, and the test of overidentifying restrictions fails to reject the null of no correlation between the IV and 2SLS residuals. In the second stage, the fitted value of *DIFFDURATION* measures is strongly negatively associated with loan spreads, supporting the proposition that the institutional features of debt-like compensation that determine its relative seniority, exert a significant effect on the incentive alignment perceived by outside lenders. Both *DIFFDURATION* measures, however, exert an insignificant effect on covenant usage (untabulated).

We acknowledge several important limitations to this analysis. First, the *DIFFDURATION* measures are noisy. Disclosures of retirement age and lump-sum options are often incomplete, necessitating assumptions for missing values. The fact that withdrawal schedules are not required disclosure for ODC plans also necessitates the crude assumption that all ODC balances are withdrawn at retirement. Second, the measures only capture one aspect of seniority, namely the duration of debt-like compensation relative to outside debt claims. If debt-like compensation is voluntarily funded through a trust, it may carry lower risk of loss than outside debt claims, regardless of when it is settled; the disclosure of funding arrangements in proxy statements is however poor.[19] Third, although we incorporate both *RLEV* and *DIFFDURATION* into the OLS analysis, we do not incorporate both measures into the IV analysis because we lack sufficient instruments.

4.3. Ex Ante Effect of Different Forms of Debt-Like Compensation

If borrowers recognize that debt-like compensation is an effective way to reduce borrowing costs, then we would expect firms anticipating the issuance of new debt in the future to award more debt-like compensation to their top executives. We test this prediction by examining whether the change in relative leverage (Δ*RLEV*), and in CEO debt-like compensation (Δ*PENODC*), from year t to $t+1$, is associated with long-term debt issuance in year $t+1$ (*DEBTFIN*). In models (1) and (2) of Table 9, we find that Δ*RLEV* (Δ*PENODC*) is strongly (marginally) positively associated with subsequent-year corporate borrowing,

[19] Note that 11% of the SERP sample discloses funding, but confidential survey data (Gerakos 2010) indicate that funding is more common. We also find that most trusts are unprotected from unsecured creditors in insolvency, possibly because bankruptcy-proof trusts are controversial with employees and investors (Sundaram and Yermack 2007).

Table 9 Ex Ante Effect of CEO Debt-Like Compensation and Its Different Forms

	(1)	(2)	(3)	(4)	(5)
Dependent variable:			*DEBTFIN*		
Δ*RLEV*	**0.024****				
	(0.011)				
Δ*PENODC*		**0.012***			
		(0.006)			
Δ*RAF*			**0.017**		
			(0.044)		
Δ*SERP*				**0.077*****	
				(0.028)	
Δ*ODC*					**0.020***
					(0.011)
ln(*MVE*)	**−0.042*****	**−0.041*****	**−0.042*****	**−0.039*****	**−0.040*****
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
ROA	**0.789*****	**0.800*****	**0.802*****	**0.796*****	**0.799*****
	(0.233)	(0.232)	(0.219)	(0.219)	(0.232)
BM	**−0.086***	**−0.079***	**−0.086****	**−0.083***	**−0.080***
	(0.047)	(0.047)	(0.043)	(0.043)	(0.047)
LEV	**0.085**	**0.096**	**0.110**	**0.111**	**0.098**
	(0.094)	(0.093)	(0.087)	(0.087)	(0.093)
TANGIBILITY	**0.031**	**0.032**	**0.017**	**0.007**	**0.029**
	(0.062)	(0.062)	(0.057)	(0.057)	(0.062)
SIGMAOCF	**0.130**	**0.166**	**0.305**	**0.278**	**0.159**
	(0.337)	(0.336)	(0.285)	(0.286)	(0.334)
ALTMANZ	**−0.018****	**−0.017****	**−0.019*****	**−0.019*****	**−0.017****
	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)
Intercept	**0.489*****	**0.473*****	**0.470*****	**0.452*****	**0.474*****
	(0.097)	(0.096)	(0.089)	(0.089)	(0.096)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	568	568	568	568	568
Adjusted R^2	0.153	0.154	0.148	0.154	0.154

Notes. This table presents the OLS regression results examining the relation between changes in CEOs' debt-like compensation from year t to year $t+1$ and debt financing (*DEBTFIN*) in year $t+1$. *DEBTFIN* is long-term debt issuance (Compustat item *DLTIS*) scaled by lagged asset. The changes in CEOs' debt-like compensation are measured as changes in CEO's relative leverage (Δ*RLEV*) in column (1), changes in the sum of actuarial present value of CEOs' pension and ODC balances (Δ*PENODC*) in column (2), changes in CEO's RAF plan balances (Δ*RAF*) in column (3), changes in CEO's SERP balances (Δ*SERP*) in column (4), and changes in CEO's ODC plan balances (Δ*ODC*) in column (5). The coefficients on Δ*PENODC*, Δ*RAF*, Δ*SERP*, and Δ*ODC* are multiplied by 10,000 and the coefficient on Δ*RLEV* is multiplied by 100 for ease of presentation. Definitions of all other variables are provided in Appendix A. Coefficient estimates on year and industry fixed effects are not reported for brevity. Robust standard errors, adjusted for heteroskedasticity and clustered by firm, are reported in parentheses.

*, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively, based on two-tailed t-tests.

consistent with CEOs assuming more debt-like compensation prior to external debt financing.[20] In models (3)–(5), we decompose Δ*PENODC* into changes in the value of CEO's rank-and-file pensions (Δ*RAF*), SERPs (Δ*SERP*), and ODC plans (Δ*ODC*). While Δ*RAF* (Δ*ODC*) is insignificant (marginally positive), Δ*SERP* is positive and strongly significant (model (4)), suggesting the effect is driven by change in CEO's SERP balances, consistent with our understanding of SERPs as being most debt-like in payoffs and most likely to be exposed to similar risk of loss as outside debt.

[20] Although Table 9 reports an association between inside debt grants and ex post future debt financing (an empirical proxy for ex ante debt financing needs), it is not definitive proof of a causal effect from ex ante financing needs to inside debt grants. Demonstrating the latter would require an exogenous shock to ex ante debt financing needs, which is challenging to find.

5. Additional Analyses

5.1. Alternative Measure of Loan Contract Strictness

Although counting the number of covenants is common in the literature (e.g., Bradley and Roberts 2004), Murfin (2012) proposes a more refined measure of contract strictness incorporating not only the number of covenants but also the initial slack allowed for each covenant and the covariance between covenants. We follow Murfin (2012) to measure contract strictness. As 38% of our loan packages have no covenants recorded in DealScan, this measure is highly skewed.

We convert it to a tercile variable, and reestimate Equation (1) with this dependent variable for the 1,267 packages with available data (untabulated). *RLEV* is negative and significant; higher CEO relative leverage is hence associated not only with fewer covenants, but also with lower overall strictness of contracts.

5.2. Alternative Measures of CEO Debt-Like Incentives

One remaining concern is that our results are attributable to "denominator" effects. There are two potential denominator effects—from firm leverage and from inside equity.[21] To address the first effect, we replace *RLEV* with CEO inside leverage (*INSIDE_LEV*, mean = 30.6%, median = 9.7%). To address the second effect, we replace *RLEV* with the inside debt-to-firm debt ratio (*DEBT%*, mean = 0.64%, median = 0.18%). Untabulated results show negative and highly significant (marginally significant at 10% level) coefficients on *INSIDE_LEV* and *DEBT%*, in *SPREAD* (*COVENANT*) tests, suggesting that these denominator effects cannot explain away the documented findings.

RLEV captures levels but not changes in values of debt and equity. Following Wei and Yermack (2011), we construct a "relative incentive ratio" (*RLEV_marginal*), which captures the marginal change in CEO inside debt over the marginal change in CEO inside equity, given a unit change in overall firm value, scaled by the marginal change in firm outside debt over the marginal change in firm outside equity, for the same unit change in overall firm value. *RLEV_marginal* has a mean (median) of 0.35% (0.08%). Our inferences are robust to this measure.

We also adjust *RLEV* by defining firm leverage as the sum of firm debt and debt-like compensation of all named executives, assuming that all debt-like compensation can be viewed as inside debt (*RLEV_Adj* mean = 1.07, median = 0.33). Finally, we transform *RLEV* into its natural logarithm to mitigate skewness. In both cases, the results continue to hold.

[21] Consider that *RLEV* = inside leverage/firm leverage. The first denominator effect arises from firm leverage, i.e., cross-sectional variation in firm leverage may drive the reported coefficients on *RLEV*, as a higher firm leverage (a lower *RLEV*, all else constant) may imply higher credit risk and be associated with worse loan terms, yielding a negative relation between *RLEV* and *SPREAD/COVENANT*. Rewriting *RLEV* as (inside debt/inside equity) ÷ (firm debt/firm equity) and rearranging it to (inside debt/firm debt) ÷ (inside equity/firm equity) illustrates the second denominator effect. That is, cross-sectional variation in inside equity ownership may be driving reported coefficients on *RLEV*. For example, consider firms with significant growth opportunities. CEOs of these firms may have high equity ownership (i.e., high inside equity/firm equity) and these firms, because of their high risk profile, are only likely to obtain loans with higher spreads and stricter covenants. This again yields a negative relation between *RLEV* and *SPREAD/COVENANT*.

6. Conclusion

Using a sample of 1,462 private loans issued during 2006–2008, we find that as CEO relative leverage from pension and ODC plans increases, private lenders charge lower spreads and include fewer covenants in loan contracts, consistent with private lenders perceiving pension and ODC plans as aligning managerial interests closer to their own. The incentive-alignment effect is driven primarily by pension benefits accrued under SERPs, as opposed to pension benefits accrued under tax-qualified RAF plans or balances in ODC plans. Furthermore, loan spreads are lower when debt-like compensation claims can be withdrawn only after outside debt claims are expected to settle, suggesting that the seniority of debt-like compensation also matters to outside lenders, in addition to its magnitude.

Our findings point to a nuanced, twofold understanding of how private lenders perceive executive debt-like compensation: Although they perceive some pension plans (SERPs) as aligning managerial interests closer to their own, they do not appear to perceive a substantial proportion of debt-like compensation as creating incentive alignment. The incentive alignment from debt-like compensation, therefore, depends crucially on the extent to which it exposes executives to similar risk of loss as unsecured outside debtholders. Our study leaves some interesting questions for future research. In particular, the lack of detailed disclosures on the institutional features of ODC plans makes it challenging to reliably assess the extent to which these plans are truly debt-like in nature; if these disclosures improve in the future, further examination will enhance our understanding of the incentive-alignment effect of ODC plans.

Supplemental Material

Supplemental material to this paper is available at http://dx.doi.org/10.1287/mnsc.2013.1813.

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Appendix A. Variable Definitions

Variable	Definition
Dependent variables: Loan contracting terms	
SPREAD	All-in-drawn spread, expressed in basis points scaled by 100.
COVENANT	The sum of 17 covenants, each coded one if present in a package and zero otherwise, at the inception of the package. The covenants are maximum debt to EBITDA, minimum interest coverage, minimum fixed charge coverage, maximum leverage ratio, maximum capital expenditure, minimum net worth, maximum senior debt to EBITDA, minimum current ratio, minimum EBITDA, minimum tangible net worth, maximum debt to tangible net worth, minimum cash interest coverage, minimum debt service coverage, maximum debt to equity, maximum senior leverage, minimum quick ratio, and maximum loan to value covenants.
Key independent variables: CEO debt-like compensation and its institutional features	
RLEV	The ratio of CEO's inside leverage to firm leverage. Inside leverage is the sum of actuarial present value of pension balances and ODC balances divided by the sum of stock value, restricted stock value, and value of stock option holdings (calculated using the Black–Scholes formulae). Firm leverage is the sum of long-term debt and debt in current liabilities divided by market value of equity.
RLEV_PEN (*RLEV_ODC*)	The ratio of CEO's pension (ODC)-to-equity ratio to firm leverage.
RLEV_RAF (*RLEV_SERP*)	The ratio of CEO's rank and file pension (SERP)-to-equity ratio to firm leverage.
DIFFDURATION_NRA	Indicator variable set to one if the Macaulay duration of the firm's debt-like compensation is greater than loan maturity in years and zero otherwise (or if a firm does not grant debt-like compensation). Macaulay duration is estimated as follows: (i) For firms with SERPs, we first estimate the annual pension payout *ANNPAYOUT* as $SERP/\{1/(1+r)^{TTR}+1/(1+r)^{TTR+1}+\cdots+1/(1+r)^{TTD}\}$, where *SERP* is the accrued SERP balance, r is the pension discount rate from Compustat, *TTR* (*TTD*) is the CEO's time-to-retirement (time-to-death). *TTR* is estimated by hand-collecting normal retirement age from proxies and subtracting current age. We assume retirement age of 65 when it is not disclosed. For CEOs past retirement age, we set $TTR=1$. *TTD* is the CEO's time-to-death, set to remaining life expectancy (gender-specific), from the Center for Disease Control's National Vital Statistics Reports (http://www.cdc.gov/nchs/products/nvsr.htm). For SERPs with lump-sum options and for ODC plans, we assume that the entire amount is paid one year after retirement. (ii) Calculate the weighted-average duration of the SERP and ODC cash flows, using the proportions of the present value of each cash outflow to total present value, as weights (i.e., Macaulay duration per Weil 1973). (iii) For firms with both SERPs and ODC, weight each duration by the ratio of SERP or ODC balances to total debt-like compensation.
DIFFDURATION_URA	Same as above, but step (i) uses the earliest age at which the CEO can retire and still claim unreduced benefits.
Control variables: CEO characteristics and CEO cash and equity compensation	
ln(*TENURE*)	Natural logarithm of one plus the CEO's tenure at a firm.
ln(*SALARY*)	Natural logarithm of one plus the CEO's salary.
ln(*BONUS*)	Natural logarithm of one plus the CEO's bonus.
DELTA	Change in stock and option value for a 1% change in stock price, scaled by annual total compensation.
VEGA	Change in option value for a 0.01 change in stock-return volatility, for the CEO's portfolio of options.

Appendix A. (Continued)

Variable	Definition
Control variables: Loan characteristics	
ln(*AMOUNT*)	Natural logarithm of a facility's amount.
ln(*MATURITY*)	Natural logarithm of a facility's maturity in months.
N_BANK	Number of lenders for a facility.
IB (*USBANK, FRBANK*)	Indicator variable set to one if at least one of the facility's lead lenders is an investment bank (U.S. bank, foreign bank) and zero otherwise. Note that a deal could have multiple lead arrangers.
Control variables: Borrowing firm characteristics	
ln(*MVE*)	Natural logarithm of market value of equity.
ROA	Return on assets (income before extraordinary items/lagged total assets).
BM	Book-to-market ratio (book value of equity/market value of equity).
LEV	Leverage (long-term debt and debt in current liabilities/total assets).
Control variables: Borrowing firm characteristics	
TANGIBILITY	Asset tangibility (net property, plant, and equipment /total assets).
SIGMAOCF	Standard deviation of operating cash flows minus extraordinary items and discontinued operations, scaled by lagged total assets over the past five years (including the current year).
ALTMANZ	Altman's *Z* score, calculated following Hillegeist et al. (2004) for manufacturing firms, and Altman (2000) for nonmanufacturing firms.
Variables used in the instrumental variable analysis	
TAXRATE_WAGE, *TAXRATE_GAIN*, *TAXRATE_MORT*	Maximum tax rate for wages, long-term capital gains, and mortgage subsidy faced by CEO in the state where her firm is headquartered; calculated using TAXSIM model (http://www.nber.org/~taxsim/state-rates/, Feenberg and Coutts 1993).
PCT_RICH	The number of individual returns filed in a state-year with AGI of $200,000 or more, scaled by the state-year's total number of individual returns.
STATE_CORPTAX	Maximum state corporate tax rate in the state where a firm is headquartered, as stipulated in annual state tax rate tables.
FIRM_MARGTAX	Prefinancing firm marginal tax rates, from Blouin et al. (2010).

Appendix B. Do State Personal Taxes Affect Corporate Leverage? An Extension of Graham (1999)

	(1)	(2)	(3)	(4)
Sample period:	2001–2010	2001–2010	2006–2008	2006–2008
Dependent variable:	*DEBT/VALUE*			
CMTR	**0.258*****	**0.257*****	**0.269****	**0.272****
	(0.046)	(0.046)	(0.119)	(0.120)
$PTP_{FEDERAL}$	**−0.087****	**−0.085****	**−0.029**	**−0.038**
	(0.037)	(0.041)	(0.117)	(0.130)
PTP_{STATE}		**−0.008**		**0.025**
		(0.071)		(0.137)
$T_{CORPSTATE}$	**−0.078**	**−0.070**	**−0.170**	**−0.197**
	(0.081)	(0.107)	(0.188)	(0.254)
Q	**−0.031*****	**−0.031*****	**−0.037*****	**−0.037*****
	(0.002)	(0.002)	(0.004)	(0.004)
PPE/ASSETS	**0.143*****	**0.143*****	**0.127*****	**0.127*****
	(0.008)	(0.008)	(0.013)	(0.013)

Appendix B. (Continued)

	(1)	(2)	(3)	(4)
Sample period:	2001–2010	2001–2010	2006–2008	2006–2008
Dependent variable:	*DEBT/VALUE*			
OPINC/ASSETS	**−0.324*****	**−0.324*****	**−0.275*****	**−0.275*****
	(0.031)	(0.031)	(0.053)	(0.053)
ZMOD	**−0.025*****	**−0.025*****	**−0.027*****	**−0.027*****
	(0.002)	(0.002)	(0.003)	(0.003)
SIZE	**0.002***	**0.002***	**−0.002**	**−0.002**
	(0.001)	(0.001)	(0.002)	(0.002)
OENEG	**0.116*****	**0.116*****	**0.151*****	**0.151*****
	(0.023)	(0.023)	(0.041)	(0.041)
NODIV	**0.014*****	**0.014*****	**0.014***	**0.013***
	(0.003)	(0.004)	(0.007)	(0.007)
ECOST	**−1.035*****	**−1.033*****	**−0.708**	**−0.718**
	(0.270)	(0.272)	(0.533)	(0.539)
Intercept	**0.181*****	**0.180*****	**0.219*****	**0.221*****
	(0.021)	(0.022)	(0.048)	(0.051)
Year fixed-effects	Yes	Yes	Yes	Yes
Observations	5,483	5,483	1,791	1,791
Adjusted R^2	0.377	0.377	0.372	0.372

Notes. This table presents OLS regression results with *DEBT/VALUE* as the dependent variable, calculated as long-term debt plus debt in current liabilities, divided by market value of the firm, defined as book value of assets—book value of equity + market value of equity. *CMTR* is simulated corporate marginal tax rate before financing. Data are kindly provided by John Graham and are estimated using procedures in Graham (1996a, b). $PTP_{FEDERAL}$ is the personal tax penalty to holding a firm's debt (vis-à-vis its equity) arising from federal taxation and is calculated using the formula in Graham (1999): $PTP_{FEDERAL} = T_{PFED} - (1 - CMTR) \times T_{EFED}$, where T_{PFED} = personal federal tax rate on ordinary income (which applies to interest income), and T_{EFED} = personal federal tax rate on equity income, which in turn is defined as $T_{EFED} = d \times T_{DIVFED} + (1 - d) \times \alpha \times T_{CGFED}$, where d = dividend payout ratio, α = the benefit from deferring taxes on long-term capital gains, assumed to be 0.25, per Graham (1999), T_{DIVFED} = personal federal tax rate on dividends, and T_{CGFED} = personal federal tax rate on long-term capital gains. We measure T_{PFED} using OECD surveys of the maximum federal personal tax rate on ordinary income. We measure T_{DIVFED} similarly using the maximum federal personal rate on qualified dividends and T_{CGFED} using maximum federal personal rate on long-term capital gains. The dividend payout ratio d is lagged dividends divided by the moving average of income before extraordinary items for years $t-1$ through $t-5$. Negative values of d are replaced by the most recent positive value from the past five years. PTP_{STATE} is the personal tax penalty to holding a firm's debt (vis-à-vis its equity) arising from state taxation and is calculated using the same formula but modified to use state-level tax structure: $PTP_{STATE} = T_{PSTATE} - (1 - CMTR) \times T_{ESTATE}$, where T_{PSTATE} = personal state tax rate on interest income and T_{ESTATE} = personal state tax rate on equity income, defined as $T_{ESTATE} = d \times T_{DIVSTATE} + (1 - d) \times \alpha \times T_{CGSTATE}$, where $T_{DIVSTATE}$ = personal state tax rate on dividends, and $T_{CGSTATE}$ = personal state tax rate on long-term capital gains. We measure $T_{PSTATE}(T_{DIVSTATE})$ using the state simulated maximum marginal rate on wage income from the National Bureau of Economic Research (NBER) data set, with the assumption that interest (dividends) is taxed the same manner as wages (MA, NH, and TN tax interest and dividends differently from wages; for these states, we use the maximum statutory rate on interest/dividend income from the Tax Foundation). We measure $T_{CGSTATE}$ using the state simulated maximum marginal rate on long-term capital gains from the NBER data sets. $T_{CORPSTATE}$ is defined as $T_{CORPSTATE} = (1 - CMTR) \times$ {state maximum statutory corporate tax rate × (*CMTR*/federal top statutory corporate tax rate)}. State maximum statutory corporate rates are from the Tax Foundation. Q is {preferred stock + market value of common equity + book value of long-term debt + net short-term liabilities}/total assets. *PPE/ASSETS* is net property, plant and equipment/total assets. *OPINC/ASSETS* is cash flow from operating activities/total assets. *ZMOD* is a modified Altman Z score, defined as 3.3 × {earnings before interest and taxes/total assets} + 1.0 × {sales/total assets} + 1.4 × {retained earnings/total assets} + 1.2 × {working capital/total assets}. *SIZE* is the natural logarithm of revenues. *OENEG* is an indicator variable for negative owners' equity, set to one if owners' equity <0 and set to zero otherwise. *NODIV* is an indicator variable for nondividend paying firms, set to one if current year dividends = 0 and set to zero otherwise. *ECOST* is {standard deviation of first difference of earnings before interest and tax over year $t-1$ to $t-3$/moving average of total assets over $t-1$ to $t-5$} × (advertising expense + R&D expense)/revenues). Coefficient estimates on year and industry fixed effects are not reported for brevity. Robust standard errors are in parentheses.

*, **, and *** indicate significance levels at 10%, 5%, and 1%, respectively, based on two-tailed t-tests.

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